13 Vegetation is open orchard bush with fine-leaved thorny trees predominating over an occasional broad-leaved variety. The terrain although very gently undulating here and there is for the most part flat and low lying (elevation 1,000 feet) with a more or less continuous short feathery grass cover. The loose, deep, easily worked sandy soil is excellent for cultivation while the lack of a thick vegetation cover makes the clearing of new farmland a relatively easy task.

241 The main cereal crop is millet and a considerable amount of guinea corn (sorghum) is grown, especially in the southern portions of the Emirate. In addition to the grain staples, beans, maize, cassava, cucumber, tomatoes, and squashes are also cultivated, while groundnuts 242 are used as the cash crop. In recent years, the agricultural department has been introducing fruit trees into the southern portions of the Emirate and scattering small orchards here and there through the northern bush with the idea of developing a local fruit industry.

101 [197] The people we are concerned with refer to themselves as Kanuri and speak a language of the same name. They call their territory Bornu and sometimes refer to themselves as kam Bornube (the people of Bornu). Among Hausa speakers in Nigeria the Kanuri and their language are known as Beri-Beri, but the Kanuri rarely use this term unless they are away from Bornu.

144 [142] Racially the Kanuri are difficult to place. Like other people at the southern rim of the Sahara they vary from negroid to caucasoid in appearance and in skin colour from coppery brown to very 143 dark. Studies by Chalmers on blood group characteristics have shown 144 that when lumped with other northern Muslim peoples the Kanuri indicate considerable similarity in ABO, MNS, and Rhesus blood groups, to

425 571 The high proportion of land obtained by political and religious specialists from the political leader reflects the social relations of these informants, many of whom have a close subordinate relationship to followers and supporters of the Lawan of their town.

241 [651] [134] Operating costs for rural farm plots are governed by two factors. Firstly, there are tithes (zakat) which all farmers pay to their local political leader as a form of traditional tax. Secondly, there is soil depletion which brings decreasing results for equal effort through [433] time. Thus even with proper planting, weeding and harvesting, the yield on a one acre plot of millet may range from eighty to four hundred pounds of threshed product, while the range for groundnuts is almost as large (one hundred and ten to three hundred and fifty pounds of decorticated • 242 nuts per acre). Farm plots are generally used for three to five year 425 periods and then left fallow for four to six years. It should be noted 571 that this soil depletion factor tends to activiate the political organization.(1) The farmer requiring new land generally seeks the advice of his local political leader as to whether to clear new bush land or perhaps take up some unused old plot already cleared, if such be available.(2)

423 In summary, land in Bornu can be categorized under four headings: (1) private property, which today refers primarily to house sites in large cities: these are not deeded but they can be rented or sold in a commercial transaction; (2) usufruct property, that is owned because the holder uses it, or cleared it from the bush; this also refers to

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(1) Increased numbers in the household operates to the same effect.

(2) In order to avoid the anomaly of a higher political authority having to ask a lower one for favours, in places like Magumeri which house a District Head, a large section of land is set aside for the use of the incumbent D.H. and his subordinates. Thus the followers of the D.H. may apply directly to him rather than the local Lawan for land use rights. N.A. employees have their choice, they may ask the D.H. or the Lawan if they wish to obtain farm plots. In all these cases it is understood that tithing is unnecessary, for none of the persons involved are "peasants of Lawan".

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turn divided into craft work, sales of surplus agricultural products, and a complex middleman trade between markets. There is a large variation in dependence upon the market as against subsistence agriculture for obtaining total income, although some farming is carried on by almost everyone except a few full-time specialists.

The society is stratified, with status based on tribal membership, occupation, birth, age, wealth, and to some extent, urban residence identifications. The people recognize two major class divisions — the upper or ruling class (*Kəntuoma*) and the broad base of the peasant class (*tala*), under the autocratic hegemony of the rulers. Rosman (1959) uses eight separate categories of social status in his work on Kanuri acculturation. Cohen (1959) has used status gradients and their inter-relationships to explain social differentiation, upward mobility, and class structure.

The society has a monarch, the Shehu, in his capital city of Maiduguri, and courtly life with nobles, including *Ajia*, or District Heads, who live in their own district capitals as sub-rulers of twenty-one segments of the emirate under the Shehu. District Heads in turn have under their jurisdiction a group of contiguous Village Area units headed by *Lawan* or Village Heads. Under these latter are Hamlet Heads, *Bulama*, in charge of small settlements of contiguous compounds. Peasants call themselves the peasants of such and such a *Lawan*. Today the Native Administration departments have their personnel stationed throughout the districts. Along with the District Head and his followers they form an urban upper class living in the districts throughout the state.

The Situation

As part of a general programme of economic development in Northern Nigeria, agricultural research stations have been set up by the government in every province of the region. The results are published in annual reports so that Agricultural Officers may begin introducing new seeds, fertilizers, and even new crops on a wide scale as soon as these improvements are known to be feasible under local conditions.

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•242 197 During 1956-7 the Agricultural Officer of Bornu Province was a Kanuri who had studied tropical agriculture in Egypt, Iraq, Israel, and India. He was very enthusiastic about the introduction of citrus crops into the area, and spent a large part of his time helping to get this programme under way in the southern part of the province. He was also interested in introducing super-phosphate fertilizer into the agricultural practices of Kanuri cultivators to increase the yield of millet and groundnuts.

241 The average yields for the province using traditional techniques are approximately 600 lbs. of groundnuts (decorticated) and 400 lbs. of millet (threshed) per acre. The yields diminish as one travels north towards the desert, and farm sizes increase in proportion, although farm size is also dependent upon family size, marriage stability, and the socio-economic relations of the cultivator within the community (Cohen, 1959). Research has [242] proven that the use of super-phosphate fertilizer can raise agricultural productivity in Bornu from 25% to 40% above that normally obtained with traditional growing techniques.

Two methods of planting crops are known. The bulk of the farm plots for most cultivators are the *kulo karabe* or far farms.[1] These are located beyond a two hundred yard perimeter (approximately) around the village. Here crops are planted [221] a week or two after the first rains, hoed twice during the wet season, and harvested in the period from November to the end of December. In the *kulo fatobe* or near farms, within a two hundred yard perimeter around the village, and within the household itself, maize and vegetables are planted with compost, mostly from sheep, goats, horses, and burnt ashes. This is placed on the soil during planting, and may be applied again during the growing season. Sometimes the compost is put into the ground along with the seeds.

101 The following course of events was observed in Magumeri, [162] a comparatively small district capital (population 2000), forty-five miles northwest of Maiduguri, the provincial capital.

[1] Literally this expression means "bush farm," and *kulo fatobe* translated literally would be "house farm." For purposes of descriptive convenience and accuracy, the writer has coined the phrases "near" and "far" farms.

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The Course of Events

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For the three years prior to 1956, the agriculture department of Bornu Province had sent super-phosphate to the District Head of Magumeri. The District Head called in his Village Area Heads and distributed the fertilizer among them. These Village Area Heads were in turn under instructions to give out the fertilizer to local cultivators. Some did so, some did so half-heartedly, and some not at all. Since there was no great pressure from the higher echelons of the political organization to get the programme under way, the super-phosphate was simply considered a matter of local choice. Peasants who tried the fertilizer claimed that it was useless.

In early June, 1956, the Agricultural Officer sent a letter to all District Heads informing them that he intended to carry out a lecture tour of the Province. The District Head of Magumeri sent out directives to make sure that a large group of people would gather in the district capital for the occasion. The talk centred round two main points. First, the great superiority of European technology; here references were made to motor cars, radios, aeroplanes, and to the fact that super-phosphate fertilizer increased the productivity of indigenous crops. Secondly, the Officer remarked repeatedly that for the last three years the peasants had been using the fertilizer improperly by depositing the super-phosphate pellets into the ground with the seeds. This provided no benefits whatsoever for the plants, and might easily do them some harm. The lectures were given in Kanuri, the native language of the Agricultural Officer.

On June 30th, 1956, Malam Abdulla Yajuwa an agricultural field worker, from the Bornu department of Agriculture came to Magumeri. His instructions were to carry out thirty or more demonstration trials in the Magumeri area on low fertility far farms (*kulo karabe*). This was to be done in cooperation with the cultivator who would permit Malam Abdulla to mark off one acre of farm plot, divide this into two halves, and apply super-phosphate fertilizer to one half and not the other. The farmer was to accompany the field worker so that the method of application could be observed and explained.

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242 Two one-acre plots were to be used for each peasant, so that
177 the utility of the fertilizer could be seen on both millet and groundnut plots. In addition, the field worker was to keep careful records on date of sowing, date of application of fertilizer, dates of first and second weeding and harvesting, farmer reaction to super-phosphate, name and village of the cultivator, and finally, the weight in pounds of millet and groundnuts harvested per half acre on the demonstration plots. The field worker was instructed on the necessity of weighing the harvest from each half acre in the presence of the owner, so that each peasant would see the difference in yield from the treated and untreated portions of the plots. The instructions on this last point were very strongly worded and field workers were made to feel particularly responsible for the final demonstration to the farmer of the weight of crops coming from each part of the demonstration plots. Field workers were also told to play down the efficacy of this particular stock of super-phosphate pellets by commenting on its age and its probable loss of power in comparison to new super-phosphate which could be expected to give much more powerful results. The field worker was also asked to make the point that this free application was only for the purpose of demonstration, and that anyone wishing to obtain super-phosphate fertilizer in the future would be expected to buy it. (Actually, the plan was to distribute the fertilizer the following year at a very nominal price, well below its actual worth.)

The District Head organized a meeting of Magumeri cul-
632 tivators and introduced Malam Abdulla and his project. The
875 Village Head of Magumeri and the local school teacher, both
554 highly respected men in the village, made short speeches extolling the virtues of the fertilizer, and the Village Head asked for volunteers who would participate in the project. Only a few came forward, others were then ordered to do so, and the rest of the Magumeri sample was obtained through the participation of the school teacher and servants of the District Head, all of whom had their own farm plots. Malam Abdulla also went to two other villages in the area, after obtaining the permission of the District Head, and obtained "volunteers". In

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one of these, Chingowa, he was refused any cooperation by the Village Head at first, because this leader had heard nothing about the project from the District Head. When the District Head sent out a directive about the demonstration, the cultivators were forthcoming.

During the next few weeks, Malam Abdulla went round to the farms of all participants choosing infertile unfertilized plots. He then measured off two one-acre plots (if possible) and divided these in half. Four to fifteen days after the plants had germinated he applied the super-phosphate in the company of the cultivator. He explained in a friendly, cheerful, manner how it was necessary to make a small hole two to four inches away from the stalk and pour in a few pellets.

From July until harvest time in the fall, Malam Abdulla made monthly visits to all participants in the demonstration. During these visits he extolled the virtues of super-phosphate fertilizer, and together he and the cultivator went out to the plots and measured the height of the plants, and examined them comparatively. It was obvious in almost all cases that the plants treated with super-phosphate were larger, healthier, and broader-leafed. The contrast was especially marked for groundnuts since the untreated plants looked generally to be about half the size of the treated ones.

At harvest time Malam Abdulla did his best to make appointments with all the participants so that he could be on the spot to separate treated from untreated crops, and to keep the yields of the experimental one acre separate from other plots not included in the demonstration. This was not possible for sixteen out of seventy-eight cultivators. These men simply harvested their crops and took no notice of the experimental plots even though they had participated in the scheme up until harvest time.

For the rest, the results were varied, but the overall technological success of the demonstration was indisputable. For those measured, there was a mean increase in millet of 30.3% per test plot, and a mean increase of 35.1% for groundnuts. Variation was large, although almost everyone obtained at least a 10% increase on their fertilized plots, while some received

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242 177 gains running up to 300%[2]. In two cases for groundnuts and ten for millet, the increase on the test plot was less than 10% of that on the non-fertilized one. These twelve plots were owned by nine people: allowing for eight cases of negligence through absense or sickness, this leaves forty-three cultivators who experienced a significant (more than 10%) increase in productivity due to the action of super-phosphate fertilizer.

After the harvest season (November to January) had ended nothing more was done on the project for some time. Malam Abdulla prepared his report and turned it in to the Agriculture department at the capital, but remained in the Magumeri area. In March a District Council meeting was held in Magumeri, and the fertilizer was on the agenda for discussion.

242 177 634 The District Council, under the chairmanship of the District Head is composed of Village Heads, Ward Heads and some elder compound heads from the various villages and hamlets of the district. The body, a British innovation, discusses local planning, and votes on the disbursement of a small amount of money known as the District Council Fund.

This was a rather special occasion for the Council, for they were to have an African District Officer rather than a European, which was the usual practice. Generally speaking, the meeting differed considerably from all other Council meetings attended by the writer. The people seemed much more relaxed, much less stiff and formal compared to previous occasions. Comments passed back and forth between one person and another, whereas at previous sessions, people had sat silently, and never spoke unless spoken to first by a superior. The resulting loss in orderliness was offset by a large gain in freedom of expression. [782] Many participants remarked afterwards on this difference and spoke favourably of the African District Officer, who prayed with the people at both the beginning and end of the meeting.

242 177 During the meeting, the District Head announced that the super-phosphate fertilizer was to be available within the next month or two for sale to those who would like to buy it. Several

[2] The standard deviations for these averages are as follows: millet, 25.2; groundnuts, 20.1.

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objections to the fertilizer were voiced immediately. The school teacher of Magumeri gave a short talk extolling the virtues of super-phosphate and reminded the people that European technology was "a wonderful thing". He also repeated the claim that there had been widespread misuse of the fertilizer in the years before Malam Abdulla had come to show them how to use it correctly. Although this was heard in polite silence, objections to the fertilizer were still raised after the school teacher had finished. Several older men murmered, *faida ba* (useless), *ngəlagnyi* (no good) and similar negative phrases. Finally, Malam Abdulla spoke to the meeting for about twelve minutes. He gave a rough summary of his work in the Magumeri area, and remarked repeatedly that the demonstration had been a complete success with many farmers. He explained that in those cases where the fertilizer had failed to give results, the farmers in question had done little or no hoeing, and the crop failures were therefore due to negligence and not the super-phosphate.

However, when the District Head asked the people to estimate how many would be interested in purchasing bags of super-phosphate pellets, there were no volunteers. On the contrary several old men stood up and gave sharply condemnatory speeches about the fertilizer. It was claimed that this fertilizer worked in Kano, Katsina, and Zaria, i.e. elsewhere in Northern Nigeria, where the soil was much redder. In Magumeri the soil was yellow, and needed compost or cattle dung; the super-phosphate was not entirely useless, but for the Magumeri area it was not practicable. Without standing up, several others made similar comments, and a negative consensus was soon reached. The super-phosphate fertilizer was the wrong kind of thing to use on farms in this area. No one rebutted these arguments, and no one mentioned the successful demonstration after Malam Abdulla had spoken.

The District Head closed the matter by saying that he would have a letter written to the agriculture department reporting the views of the Magumeri peasants, and asking for a field worker to be sent who would teach the people how to use the new fertilizer.

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And so, after ten months of work the project was back where it had started. It may be that in future years the people will come to accept super-phosphate fertilizer: now, however, there is as much resistance to it as there was at the beginning of the demonstration.

Analysis

The demonstration of super-phosphate fertilizer in the Magumeri area was in most essentials a technical success. The programme was introducted by a Kanuri field worker employed by the Agriculture department which was under the direction of a senior Agricultural Officer who was himself a Kanuri. What went wrong? Why did the people so unanimously reject the innovation?

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In discussing factors affecting economic growth, Linton (1952: 76) has commented that people will improve their lot unless they have had adverse experiences in the past with a particular innovation. This point is particularly relevent to the situation under discussion.

Some of the people in Magumeri had used the fertilizer in previous years without adequate instruction. By placing the pellets in the ground with the seed, they had damaged the plants in some cases, and killed them in others. When the Agricultural Officer made his speech in June, 1956, people remarked afterwards that the *bundar nasarabe* (European compost) was useless. It was agreed that European technology was very wonderful, but the Europeans did not grow millet and groundnuts, and therefore knew nothing of the techniques necessary for such cultivation. Therefore the speech was in effect a failure. A field worker who had rapport with the cultivators could easily have discovered this important fact and the department would then have been aware that they were not planning an innovation at all but rather that they had a battle on their hands against a confirmed negative opinion. That references were made to the previous misuse of the fertilizer indicates that there was some appreciation of this fact. However simple contradiction was not sufficient to change these attitudes.

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Linton (1952: 77) has also suggested that peasants view any attempts to change their economic condition with suspicion when these originate from their rulers. The peasant, often quite justifiably, feels that anything his rulers offer as a chance to improve conditions is probably much more to the ruler's advantage than to his own.

This was very certainly the case in Magumeri, and had occurred several times before. Thus, only a few weeks before the fertilizer demonstration began, the Village Head of Magumeri had tried to convince people of the worthiness of literacy. His argument centered around the idea that when literate the peasants would be able to catch their rulers, including himself, for issuing false tax receipts (Cohen and Frank, 1960). When the people refused to volunteer he forced a number of individuals to sign up for the literacy courses. It is difficult to say exactly how many were forced to "volunteer" for the fertilizer demonstration, but that coercion was involved is undoubtedly true.

On the other hand, a strange and almost unprecedented thing occurred at the final meeting when the people were asked whether or not they would use the fertilizer in the coming year. District Council meetings were usually very stiff affairs in which a formal agenda was followed under the guidance of a British District Officer. Very often a District Head rehearsed these "democratic" meetings first to make sure motions would be seconded, voted on properly, etc. On this occasion, an African District Officer was present, and the District Head gave the members of the Council a definite choice as to whether they would accept the fertilizer or not. Bornu is an autocratic country and subordinates are usually ordered about, unless the matter is a trivial one. The outward signs of democratic procedures introduced by colonial rule are very superficially imposed upon feudal autocracy, so that effective social action is carried out dictatorially. This is an ancient society and people are traditionally accustomed to these procedures. That dictatorial powers were not invoked over the decision to use, or not use, fertilizer in years to come, immediately defined it as a trivial and unimportant matter upon which people could make up their own minds.

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followers, or having children. Conversely, peasants who experience a decrease in crop yields attribute this to a loss of personnel in their household (Cohen, 1959: 272-5). Thus increased yields like many other facets of self-improvement in Bornu are based on social relations, not technology, when seen from the peasants' point of view.

Although there is no confirming evidence, another factor may have been operating in this situation. The sudden release from autocratic leadership could have been an expression of the aggression, hostility, and rebelliousness, usually associated with psychological reactions to authoritarian leadership. White and Lippitt (1953: 602) have shown this to be so in their studies of children's clubs, and it may have a much wider application. Whether or not people with a long tradition of autocratic social organization experience these same feelings, with the same intensity is a question which must await further research.

The field worker, Malam Abdulla, was a young man of twenty-two. He had recently graduated from a one-year course at an agricultural technical training college and hoped to rise quickly in the Bornu department. He was, however, blocked by the seniority system which placed over him people with less education than himself. The college officials had evidently made much of the advantages of education and promised the graduates rapid advancement. But, jealousy, nepotism, and his youth held him back, for the moment, from obtaining a higher post. Malam Abdulla deeply resented this, and continually blamed his lot upon the traditional social order of Bornu. He admired European technology, which had given him his hoped-for status, and was also attracted to the western ideology of liberal democracy, with which he had come into contact in secondary school.

His department head, the Agricultural Officer, also admired European technology and culture. He lived in a European house, ate western food, and could on occasion act as a completely acculturated person. That is to say, both the department head, and the field worker indicated a generalized cathexis for western culture, not just its technology.

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242 177 This was reflected strongly throughout the fertilizer demonstration. The super-phosphate was first praised as a part of western technology which was dubbed "wonderful". It was made clear that this technique could increase productivity, but the idea was gained that it was because of European technological superiority that the fertilizer should be considered worthwhile. Perhaps the most rigid extension of western culture as well as technology, was in the use of one-acre plots as demonstration units. Since the goal of demonstration was to indicate the increase in productivity occasioned by the fertilizer, it was necessary only to obtain a plot and divide it in two. By always insisting on an acre, the field worker often left part of a farm plot out of the experiment arbitrarily, and by implication emphasized the "foreign" character of the innovation.

[829] The reaction to all this was simply to intensify the belief that Europeans knew nothing about Kanuri farming techniques.

242 177 561 [576] Another difficulty could have been the field worker's age. However, he was well aware that in Kanuri society young men do not tell older men how to behave, and was at all times polite, and respectful to older peasants. On the other hand, Malam Abdulla was a member of the political organization by training, [554] and by birth (his father was a Village Head). This gave him high status so that he could make suggestions to older people.

242 177 [829] Negative attitudes not to his age, but to his programme were reflected in peasants' statements to the writer that Malam Abdulla came from Yajuwa, to the south of Magumeri where the soil was a different colour, and therefore more amenable to the "European compost".

Finally, there was no "follow up" on the successful demonstration. The field assistant made little or no attempt to assess whether or not the peasants were convinced of the utility of the fertilizer. He conceived of his job as one in which his main task was to carry out a successful field demonstration, keep records, and turn in a final report. During the meeting, well after the harvest season when negative opinions and stereotypes had had several months to congeal, only the leaders of the community spoke of the project. No participating farmer was brought forward to speak of the success which he had observed on his

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own farm plot. This added to the general impression of the fertilizer as an intrusive item, and one which had no practical value under local conditions.

Conclusion

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The human side of innovation has often been emphasized as being just as important as the technological. The Magumeri experience reiterates the fact that the social and psychological context of innovation requires careful analysis so that variables affecting innovation may be isolated and prepared for before any development programmes are put into action. If the place of social relations, as compared to technology, in farm production had been taken into account, the results of this experiment might well have been less disappointing. Furthermore, it should be emphasized that all technology is imbedded in a welter of cultural accretions. It is the responsibility of the innovator to isolate cultural characteristics of technology which are necessary to its successfull operation, from those which are simply there because of the cultural origins of the item. This is what lies at the root of flexibility as opposed to rigidity in the introduction of western technology to the underdeveloped areas of the world.

University of Toronto.

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